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Freddy Strømmen

Freddy Strømmen
Seksjonsleder

Mette E. Hansen

Mette E. Hansen

/c

1. desember 1997

5   JGS/kr
    O:125123
    ETOP97028

10 SØKER:
    Telefonaktiebolaget LM ERICSSON
    S-126 25 Stockholm
    Sverige

15

20

OPPFINNERE:
Øyvind Breivik   Paul Torkil Fjuk
Drammensveien 50c   Hellaveien 79
25 0271 Oslo   2013 Skjetten

30

TITTEL:
Fremgangsmåte for forbedring av oppsettingen av
telefon-til-telefon-anrop
35

FULLMEKTIG:
Oslo Patentkontor AS, Postboks 7007M, 0306 Oslo

METHOD FOR IMPROVING THE SETUP OF TELEPHONE-TO-TELEPHONE CALLS

5 ## Field of the invention

Generally, the present invention relates to Internet te-
lephony and intelligent networks (IN) function.
More specifically, the present invention relates to a
10 method for improving the setup of telephone-to-telephone
calls using telephones connected to a PSTN/ISDN access
network and using a separat network, especially Internet
as a substantial by-pass network, special telephone ga-
teways (GW) forming bridges between the access network
15 and said by-pass network, and connections being establis-
hed between the user telephones (A,B) and the gateways
(GW) that bridge the call.

20 ## Background of the invention

The application area of the present invention has been
developed in connection with low tariff international te-
lephone-to-telephone calls using the Internet as the main
25 carrier network, but the general aspect of the invention
may also be related to any quality of service required.

Furthermore, the present invention is applicable not oly
to international and long distance services but also to
30 any other geographically segmented services (e.g. local,
regional, national).

Users have telephones connected to the PSTN/ISDN network.
The Internet can be used to carry portions of the tradi-
35 tional PSTN/ISDN telephone-to-telephone calls. Special
Internet telephony gateways GW form bridges between the
PSTN/ISDN access network and the Internet (which acts as
the carrier network).

In a traditional telephone-to-telephone call, a connection between two parties is established at the call set-up phase. The originating party and the terminating party are identified by their respective telephone numbers

5   (caller A-num and callee B-num) during the set-up phase. Call logic is handled by the PSTN/ISDN network.

In a telephone-to-telephone call using the PSTN/ISDN network as the access network and the Internet as the main carrier network, connections must be established

10   between the user telephones and the gateways that bridge the call. The present invention presents a solution to the handling of call-establishment to the originating gateway. Extensions and enhancements to the basic invention are described later.

15

Prior art

Existing solution and problems with these

20

Referring to Figure 1, there will now be given a description about how a traditional internation call path is established.

The known solutions handle call establishment in two

25   phases. First, the caller (A) is required to set up a connection to a preferred originating gateway (Gwa). Second, the caller is required to dial the desired number that identifies the terminating telephone (B-num).

As an illustration, a typical, although simplified, call

30   handling sequence is as follows:

1. The caller (A) obtains a PSTN/ISDN connection to an originating gateway (Gwa) by dialing the gateway number.

2. GWa sends a new dial tone or a voice message to A to

35   indicate that the connection has been established.

3. The caller (A) dials the number that identifies the callee (B). (The gateway may extract the B-number from the connection by interpreting Dual Tone Multiple Frequency (DTMF) signals. Prior to this A may need to enter a PIN number or similar for authorization purposes).

4. GWa performs a number analysis on the B-number to find the closest GW (Gwb) to B.

5. GWa establishes a data connection (connection oriented or connectionless) to the terminating gateway (Gwb) and transfers the B-number to Gwb using the data network.

6. GWb in turn establishes the final PSTN/ISDN connection to the called party (B).

One advantage of the known solutions, in this context, is that they make use of standard PSTN/ISDN functions. However, the known solutions require the caller to handle the call set up in two distinct phases which is cumbersome. The caller is also required to know the telephone number of the preferred (i.e., closest) gateway. Indeed, the caller may need to keep a list of gateway telephone numbers if the preferred one is busy, or if it is down, or if other circumstances make it unavailable.

There are also other problems to the known solutions. These are addressed in a later chapter which provides extensions to the present invention described prior thereto.

Objects of the present invention

An object of the present invention is to provide a method for improving the setup of telephone-to-telephone calls in relation to the prior art procedures.

Another object of the present invention is to provide a
method by which the caller is allowed to handle the call
set-up in one single phase, as in the case of traditional
"local" telephone calls.

5   More specifically, an object of the present invention is
to make the associated gateways transparent to the
caller.

Still another object of the present invention is to
utilize Internet telephony and intelligent networks (IN)
10   functions in a far more efficient and less costly manner.

Brief disclosure of the invention

The above objects are achieved in a method as stated in
the preamble, which according to the present invention is
15   characterized in that for the purpose of making the ga-
teways transparent to the caller (A) the method allows
the caller (A) to dial a by-pass network service prefix
together with the number of the callee (B).

20   More specifically, it is according to the invention sug-
gested that said by-pass network service prefix, i.e. an
IN service prefix is adapted to identify the relevant IN
service for thereby routing the call to an IN node which
can execute this IN service.
25

In other words, the present invention allows the caller
to handle the call set-up in one single phase, just as in
case of conventional telephone calls, at the same time as
the gateways appear transparent to said caller.
30

Further features and advantages of the present invention
will appear from the following description taken in con-
junction with the enclosed drawings, as well as from the
appending patent claims.

35

Brief disclosure of the drawings

Fig. 1 is a sketch illustrating a traditional internatio-
nal call path.

5

Fig. 2 is a sketch illustrating an embodiment of the
method according to the present invention.

10 ## Detailed description of embodiments

Fig. 1 illustrates a traditional international call path,
which has been discussed previously, and wherein the set-
up of telephone-to-telephone calls are made using
15 telephones connected to a PSTN/ISDN access network and
using a separate network, here the Internet as a substan-
tial by-pass network, special telephone gateways GWa and
GWb forming bridges between the access network and said
by-pass network, and connections being established betwe-
20 en a caller telephone A and a callee telephone B through
appropriate gateways GWa and GWb.

An embodiment of the present method is illustrated in
Fig. 2, wherein the handling of call establishment will
25 only take place in one phase.

More specifically, the present solution uses the Intelli-
gent Network to:

30 1. Allow the user to establish a call in one single
phase.

The user dials one number: IN service prefix + B-number.
IN service prefix identifies the IN service:
'International calls over the Internet'. IN service
35 prefix is used to route the call to the IN node which
executes this IN service.

2. Automatically find the closest/available gateway

The IN service 'International calls over the Internet' will find the closest GW by analysing the A-number. The service can also route to alternative Gws if the closest is busy, etc.

5 ## 3. Establish call to the GW

The IN service will establish the call to GW, hereby named Gwa. In the call setup the Gwa number is included as destination number. In addition, the A and B-number is included.

10 A proposal/example on how this can be transferred on ISUP (IAM message)/DSS1 (SETUP message):

> CallingPartyNumber: A-number
> CalledPartyNumber: Gwa-number
> RedirectingNumber: B-number

15 The information flow (see Figure 2) is as follows:

> a = A dials: (IN service prefix + B-number) in one
> sequence
> b = Call routed to IN:
> CallingPartyNumber: A-number
20 CalledPartyNumber: (IN service prefix +
> B-number)
> c = Call routed to Gwa:
> CallingPartyNumber: A-number
> CalledPartyNumber: Gwa-number
25 RedirectingNumber: B-number

Restrictions

1. The invention couples gateway functionality with IN
30 which makes the gateway equipment dependent on IN functionality. The provider of such a service becomes dependent on an operator with the specific IN functionality.

2. Still address analysis in GWa (see Extensions).

Advantages

• Call establishment in one step only.

5   • Since IN service logic is coupled to the GW application, value added functionality can easily be included (such as automatically finding the closest or available gateway).

• Number analysis can now be coupled with other services such as short numbers for a virtual network, and UPT.

10

Extensions and enchancements to the present invention

The problem area:GWa still needs to analyse the B-number to find the GW closest to user B. Having these number analysis functions distributed implies that many Gws must

15   be updated when changes in the network occur. This is a network management problem which the extension to the basic invention solves.

Existing solutions and problems with these: The Gws can perform complete number analysis functions with B-number

20   as input and Gwb address as result. This analysis must then be in every GW and the network will be hard to maintain.

The invention: An extension to the basic invention can be made to solve the problem in such a way as to find the

25   closest terminating gateway for any terminating B-number.

IN can be used to locate the terminating gateway. Suppose that A calls a B-number. In addition to finding the E.164 number to Gwa, IN can also find the IP-address to Gwb

30   which is the gateway closest to the user B.

1. The IN maintains a list of the gateways, with their respecitve IP-address and the respective area code(s).

2. Based on the area code of the B-number the IP-address to the closest GW is found.

5   3. In the call setup towards Gwa the IP-address of Gwb is included.

4. Gwa uses the received Gwb IP-address in the remaining call handling process.

A proposal/example on how this can be transferred on ISUP
10   (IAM message)/DSS1 (SETUP message):

>CallingPartyNumber: A-number
>CalledPartyNumber: Gwa-number
>RedirectingNumber: B-number
>Subaddress: Gwb IP-address

15   The information flow (see Figure 2) is as follows:

>a = A dials: (IN service prefix + B-number)
>>in one sequence
>b = Call routed to IN:
>>CallingPartyNumber: A-number

20
>>CalledPartyNumber: (IN service prefix +
>>>B-number)
>c = Call routed to Gwa:
>>CallingPartyNumber: A-number
>>CalledPartyNumber: Gwa-number

25
>>RedirectingNumber: B-number
>>Subaddress: Gwb IP-address

Broadening

The application has only addressed the Internet as the
30   carrier or bypass network but the application can be broadened to, in general, address networks based on IP-technology and even to other packet based networks or

technology, such as Frame Relay, ATM, hybrids of these, and so on.

Furthermore, the present invention is applicable not oly to international and long distance services but also to any other geographically segmented services (e.g. local, regional, national).

References

WO-SE00680: "Speech connection set-up method for interconnected networks registering network address of users who has a telephone and PC on network, with telephone system and uses address when making call connection".

Comments: The WO-SE00680 patent is related to this patent application in the sense that it too uses certain IN functions to solve certain addressing problems related to the domain of gateways. Note, however, that it addresses a different problem within this domain. The following is a list to illustrate some of the differences:

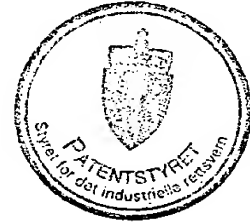• WO-SE00680 addresses an application area that have users connected to special PCs (PC connected telephones) – not plain old PSTN/ISDN telephones.

• WO-SE00680 uses IN primarily to locate called users using special PCs on a data network – not handle call set-up of telephone-to-telephone calls over the internet in one single phase.

• WO-SE00680 uses a register function to keep track of the location of the users and the gateway that the respective users have registered with – this patent application does not use such an explicit register function.

• WO-SE00680 transfers the IP-address of a called user to the gateway that the user has a priori registered with –

In its basic form this application only transfers the B-number of the called user. In its extended form the B-number and the IP-address of the terminating gateway is transfered to the originating gateway for the purpose of
5   addressing locating the nearest gateway.

ETOP97028

Patent claims

5   1.   Method for improving the setup of telephone-to-
telephone calls using telephones connected to a PSTN/ISDN
access network and using a separat network, especially
Internet as a substantial by-pass network, special tele-
phone gateways (GW) forming bridges between the access
10   network and said by-pass network, and connections being
established between the user telephones (A,B) and the ga-
teways (GW) that bridge the call,
c h a r a c t e r i z e d   i n   that for the purpose of
making the gateways transparent to the caller (A) the
15   method allows the caller (A) to dial a by-pass network
service prefix together with the number of the callee
(B).

2.   Method as claimed in claim 1,
20   c h a r a c t e r i z e d   i n   that said by-pass
network service prefix, i.e. an IN service prefix is
adapted to identify the relevant IN service for thereby
routing the call to an IN node which can execute this IN
service.
25
3.   Method as claim in claim 1 or 2,
c h a r a c t e r i z e d   i n   that said IN service is
arranged to find the most appropriate, e.g. the closest
gateway (GW) by analyzing the caller's number (A), and/or
30   possibly route the call to an alternative gateway if the
closest is busy, etc.

4.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that after the IN ser-
35   vice has established the call (A) to the most appropriate
gateway (GW), (GWa) there is in the call setup included
the associated gateway number (GWa) as destination num-

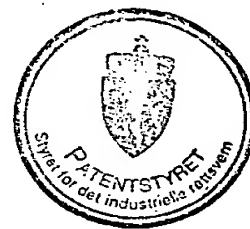ber, as well as the caller number (A) and the callee num-
ber (B).

5. Metod as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that the IN service es-
tablishes the call (A) to the most appropriate gateway
(GWa) by coupling gateway funtionality with an intelli-
gent network (IN).

6.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that address analysis
is carried out in the gateway (GWa) to which the call has
been routed.

7.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that value added funti-
onality is included by service logic means of the intel-
ligent network (IN), for example the automatic selection
of the most appropriate and/or available gateway.

8.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that number analysis is
coupled with other services, for example short numbers
for virtual network, and UPT.

9.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that the most appropri-
ate gateway for any terminating callee number (B) is car-
ried out in the intelligent network (IN), i.e. by finding
the E.164 number to an appropriate gateway (GWa), as well
as the IP (Internet Protocol) address to the gateway
(GWb) closest to the callee (B).

10.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that there is maintai-
ned an updated list of gateways in the by-pass network,
i.e. the intelligent network (IN), as well as a list of
respective IP-addresses and the respective area code(s).

11.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that the area code of
the number (B) of the callee is used to find the IP-
5   address of the most appropriate callee gateway (GWb), for
example the closest gateway thereof.

12.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that in the call setup
10   from the intelligent network (IN) towards the access
gateway (GWa) the IP-address of the terminal gateway
(GWb) is included, so that the access gateway (GWa) can
use the received terminal gateway (GWb) IP-address in the
remaining call handling process.
15

13.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that the method allows
any caller (A) to dial a called part (B) via an access
network by only dialling once, i.e. a destination number.
20

14.   Method as claimed in any of the preceding claims,
c h a r a c t e r i z e d   i n   that the most appropri-
ate gateway (GWa) or gateways (GWa, GWb) is/are selected
according to the quality of service (QoS) required, or
25   possibly according to other criteria, for example tariff,
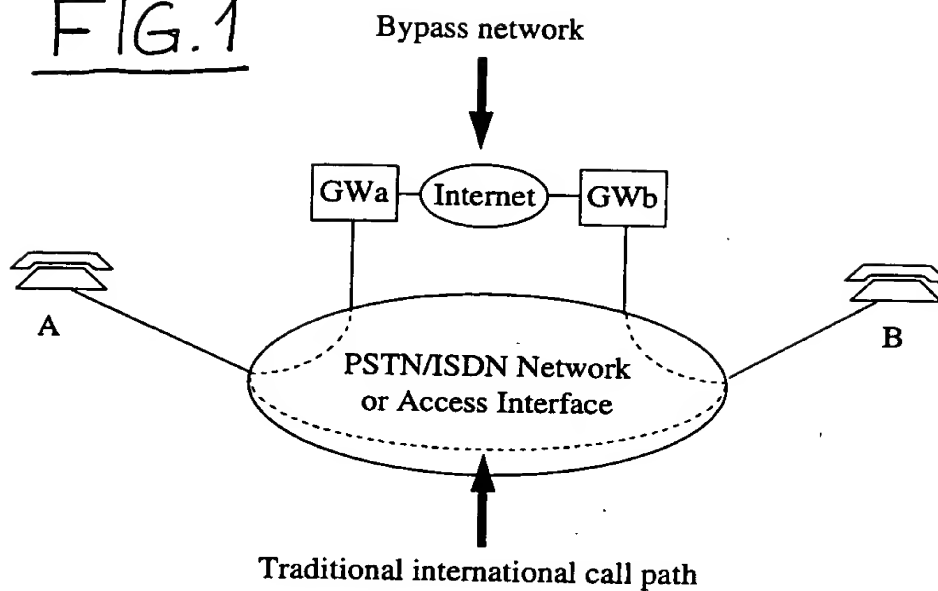availability, etc.

FIG.1

Bypass network

GWa — Internet — GWb

A

B

PSTN/ISDN Network
or Access Interface

Traditional international call path

FIG.2

SCP

SSP   Intelligent Network

c

b

GWa — Internet — GWb

A

B

a

PSTN/ISDN Network
or Access Interface